





IN THE EVENT THAT THE EXISTING MONUMENT IS DAMAGED DURING REMOVAL AND RESETING, A NEW MONUMENT CONFORMING TO THE FOLLOWING SPECIFICATION SHALL BE PROVIDED.

ITEM 511 CONCRETE MISC.: CAST STONE HISTORICAL MILE MARKER

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. CAST STONE MASONRY.

1.2 RELATED SECTIONS

- A. SECTION 04 0513 MASONRY MORTAR (MASONRY MORTARING).  
B. SECTION 04 0516 MASONRY GROUT (MASONRY GROUTING).  
C. SECTION 04 0519 MASONRY ANCHORAGE AND REINFORCEMENT (MASONRY ANCHORAGE AND REINFORCING).  
D. SECTION 04 2000 MASONRY UNITS (UNIT MASONRY).  
E. SECTION 07 9000 JOINT SEALERS (JOINT PROTECTION).

1.3 REFERENCES

- A. ASTM C 150 STANDARD SPECIFICATION FOR PORTLAND CEMENT.  
B. ASTM C 1116 STANDARD SPECIFICATION FOR FIBER-REINFORCED CONCRETE AND SHOTCRETE.  
C. ASTM C 1364 STANDARD SPECIFICATION FOR ARCHITECTURAL CAST STONE.  
D. CAST STONE INSTITUTE STANDARD SPECIFICATION (WWW.CASTSTONE.ORG).

1.4 DEFINITIONS

- A. CAST STONE: HIGHLY REFINED ARCHITECTURAL CONCRETE STONE PRODUCT MANUFACTURED TO SIMULATE FINE GRAIN TEXTURE OF NATURAL STONE.

1.5 SUBMITTALS

- A. COMPLY WITH SECTION 01 3300 SUBMITTAL PROCEDURES.  
B. PRODUCT DATA: SUBMIT MANUFACTURER'S PRODUCT DATA.  
C. SHOP DRAWINGS: SUBMIT MANUFACTURER'S SHOP DRAWINGS INCLUDING PROFILES, CROSS SECTIONS, REINFORCEMENT, EXPOSED FACES, ARRANGEMENT OF JOINTS, ANCHORING METHODS, ANCHORS, ANNOTATION OF COMPONENTS, AND THEIR LOCATIONS IN PROJECT AS INDICATED ON THE DRAWINGS.  
D. VERIFICATION SAMPLES: SUBMIT PIECES OF ACTUAL CAST STONE COMPONENTS, 12 INCHES  $\times$  305 MM SQUARE, ILLUSTRATING RANGE OF COLOR AND TEXTURE TO BE ANTICIPATED IN COMPONENTS FURNISHED FOR PROJECT.  
E. TEST RESULTS: SUBMIT MANUFACTURER'S TEST RESULTS OF CAST STONE COMPONENTS MADE PREVIOUSLY BY MANUFACTURER USING MATERIALS FROM SAME SOURCES PROPOSED FOR USE IN PROJECT.

1.6 QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS: A CAST STONE INSTITUTE CERTIFIED PRODUCER, WITH A MINIMUM OF 10 YEARS OF EXPERIENCE IN PRODUCING CAST STONE OF TYPES REQUIRED FOR PROJECT.  
1. PLANT SHALL HAVE ADEQUATE CAPACITY TO FURNISH QUALITY, SIZES, AND QUANTITY OF CAST STONE REQUIRED WITHOUT DELAYING PROGRESS OF THE WORK.  
2. PRODUCTS PREVIOUSLY PRODUCED BY PLANT AND EXPOSED TO WEATHER SHALL EXHIBIT SATISFACTORY APPEARANCE.  
B. STANDARDS: UNLESS OTHERWISE SPECIFIED IN THIS SECTION, CAST STONE SHALL COMPLY WITH THE FOLLOWING:  
1. ASTM C 1364.  
2. CAST STONE INSTITUTE STANDARD SPECIFICATION. (LATEST EDITION) MOCK-UPS ALLOW THE ARCHITECT TO VERIFY:  
a. THE COLOR AND TEXTURE OF THE CAST STONE.  
b. THE FIT OF ADJACENT COMPONENTS.  
c. THE QUALITY OF CONSTRUCTION.  
d. THE QUALITY OF REPAIR METHODS, IF NEEDED.  
C. MOCK-UPS: PROVIDE FULL SIZE CAST STONE COMPONENTS FOR INSTALLATION IN MOCK-UP OF CAST STONE MARKER. APPROVED MOCK-UPS WILL BECOME STANDARD FOR APPEARANCE AND WORKMANSHIP.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. DELIVERY:  
1. DELIVER CAST STONE COMPONENTS SECURED TO SHIPPING PALLETS AND PROTECTED FROM DAMAGE AND DISCOLORATION.  
2. PROTECT CORNERS FROM DAMAGE.  
3. NUMBER EACH PIECE INDIVIDUALLY TO MATCH SHOP DRAWINGS AND SCHEDULES.  
B. STORAGE:  
1. STORE CAST STONE COMPONENTS AND INSTALLATION MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.  
2. STORE CAST STONE COMPONENTS ON PALLETS WITH NONSTAINING, WATERPROOF COVERS.  
3. VENTILATE UNDER COVERS TO PREVENT CONDENSATION.  
4. PREVENT CONTACT WITH DIRT.  
C. HANDLING: PROTECT CAST STONE COMPONENTS DURING HANDLING AND INSTALLATION TO PREVENT CHIPPING, CRACKING, OR OTHER DAMAGE.

1.8 SCHEDULING

- A. SCHEDULE AND COORDINATE PRODUCTION AND DELIVERY OF CAST STONE COMPONENTS WITH UNIT MASONRY WORK TO OPTIMIZE ON-SITE INVENTORY AND TO AVOID DELAYING THE WORK.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. LIST MFR'S: CONTRACTOR TO PROVIDE RECOMMENDATION.

2.2 CAST STONE MASONRY

- A. CAST STONE:  
1. COMPRESSIVE STRENGTH: ASTM C 1364.  
2. ABSORPTION, COLD WATER: ASTM C 136'1.  
3. LINEAR SHRINKAGE: ASTM C 1364.  
B. SURFACE TEXTURE: ASTM C 1364.  
C. COLOR AND FINISH: ROUGH ROCK FACED FINISH TO MATCH EXISTING HISTORICAL ROUTE 40 MARKERS CURRENTLY LOCATED ALONG BROAD STREET.  
D. COLOR AND FINISH: ROUGH ROCK FACED FINISH TO MATCH EXISTING HISTORICAL ROUTE 40 MARKERS CURRENTLY LOCATED ALONG BROAD STREET.  
1. MFR'S CAST STONE COLOR NO.: SUBMIT SHOP DRAWING.  
2. MATCH COLOR: SUBMIT COLOR AND TEXTURE SAMPLE.

- E. PERMISSIBLE VARIATION IN COLOR:  
1. TOTAL COLOR DIFFERENCE: ASTM C 1364, 6 UNITS.  
2. HUE DIFFERENCE: ASTM C 1364, 2 UNITS.

2.3 CAST STONE MATERIALS

- A. PORTLAND CEMENT: ASTM C 150, TYPE I, WHITE OR GRAY AS REQUIRED TO MATCH SPECIFIED COLOR.  
B. COARSE AGGREGATE: ASTM C 1364. GRANITE, QUARTZ, OR LIMESTONE.  
C. FINE AGGREGATE: ASTM C 1364. NATURAL OR MANUFACTURED SANDS.  
D. COLORING PIGMENTS: ASTM C 1364. INORGANIC IRON OXIDES.  
E. CHEMICAL ADMIXTURES: ASTM C 1364.  
F. WATER: POTABLE.  
G. REINFORCEMENT: WHERE REQUIRED BY ASTM C 1364. (GALVANIZED) (EPOXY COATED).  
H. FIBER REINFORCEMENT: ASTM C 1116, FIBROUS NYLON.

2.4 MORTAR MATERIALS

SPECIFIER NOTES: SPECIFY THE MORTAR.

- A. MORTAR: [CAST STONE INSTITUTE STANDARD SPECIFICATION] [AS SPECIFIED IN SECTION 04 0513].

2.5 ACCESSORIES

- A. ANCHOR PINS AND DOWELS SHOULD BE STAINLESS STEEL. SHELF ANGLES AND OTHER SIMILAR STRUCTURAL ITEMS SHOULD BE GALVANIZED. CONSULT CAST STONE MFR. FOR ASSISTANCE IN SPECIFYING ANCHORS FOR THE SPECIFIC APPLICATION.  
B. ANCHORS: NON-CORROSIVE TYPE, SIZED FOR CONDITIONS. (BRASS) (HOT-DIP GALVANIZED STEEL) (TYPE 304 STAINLESS STEEL).  
C. SEALANTS: AS SPECIFIED IN SECTION 01 9000.  
D. CLEANER:  
1. MANUFACTURER'S STANDARD-STRENGTH, GENERAL-PURPOSE CLEANER DESIGNED FOR REMOVING MORTAR AND GROUT STAINS, EFFLORESCENCE, AND OTHER CONSTRUCTION STAINS FROM NEW MASONRY SURFACES WITHOUT DISCOLORING OR DAMAGING MASONRY SURFACES.  
2. APPROVED FOR INTENDED USE BY CAST STONE MANUFACTURER AND APPROVED BY CLEANER MANUFACTURER FOR USE ON CAST STONE AND ADJACENT MASONRY MATERIALS.

2.6 FABRICATION

- A. SHAPES: UNLESS OTHERWISE INDICATED ON THE DRAWINGS, PROVIDE:  
1. SUITABLE WASH ON EXTERIOR SILLS, COPINGS, PROJECTING COURSES, AND COMPONENTS WITH EXPOSED TOP SURFACES.  
2. DRIPS ON PROJECTING COMPONENTS, WHEREVER POSSIBLE.  
B. REINFORCEMENT:  
1. AS REQUIRED TO WITHSTAND HANDLING AND STRUCTURAL STRESSES.  
2. COMPLY WITH ASTM C 1364.  
3. MINIMUM OF 0.25 PERCENT OF CROSS-SECTIONAL AREA OF PANELS WHICH EXCEED 24 INCHES (600 MM) IN WIDTH.  
4. MINIMUM REINFORCING COVER: TWICE DIAMETER OF REINFORCING BARS.  
5. UNITS LESS THAN 24 INCHES IN EITHER TRANSVERSE OR LONGITUDINAL DIRECTION MAY BE UNREINFORCED IN THAT DIRECTION IF STRUCTURAL CONDITIONS ALLOW.  
C. CURING:  
1. CURE CAST STONE COMPONENTS WITH A DIRECT-FIRED STEAM GENERATOR AT A MINIMUM TEMPERATURE OF 105 DEGREES F (41 DEGREES C) FOR A MINIMUM OF 6 HOURS, WITHIN 12 HOURS OF FABRICATION.

2. CURE CAST STONE COMPONENTS IN PRESENCE OF CARBON MONOXIDE AND CARBON DIOXIDE TO PROMOTE CARBONATION AT SURFACE, TO MINIMIZE EFFLORESCENCE.

- D. FINISHING: REMOVE BLEMISHES FROM EXPOSED SURFACES BEFORE PACKAGING FOR SHIPMENT.

- E. MANUFACTURING TOLERANCES: MANUFACTURE CAST STONE COMPONENTS WITHIN TOLERANCES IN ACCORDANCE WITH CAST STONE INSTITUTE STANDARD SPECIFICATION.

2.7 SOURCE QUALITY CONTROL

- A. SAMPLING AND TESTING: ASTM C 1364.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE CONSTRUCTION TO RECEIVE CAST STONE COMPONENTS. NOTIFY ARCHITECT IF CONSTRUCTION IS NOT ACCEPTABLE. DO NOT BEGIN INSTALLATION UNTIL UNACCEPTABLE CONDITIONS HAVE BEEN CORRECTED.

- B. VISUAL INSPECTION:  
1. VISUALLY INSPECT CAST STONE COMPONENTS FOR FIT AND FINISH IN ACCORDANCE WITH ASTM C 1364 BEFORE INSTALLATION.  
2. DO NOT INSTALL UNACCEPTABLE COMPONENTS.

3.2 INSTALLATION

- A. GENERAL: INSTALL CAST STONE COMPONENTS IN CONJUNCTION WITH MASONRY, COMPLYING WITH SECTION 04 7200.

- B. SETTING:  
1. DRENCH CAST STONE COMPONENTS WITH CLEAR, RUNNING WATER IMMEDIATELY BEFORE INSTALLATION.  
2. DO NOT USE PRY BARS OR OTHER EQUIPMENT IN A MANNER THAT COULD DAMAGE CAST STONE COMPONENTS.  
3. FILL DOWEL HOLES AND ANCHOR SLOTS COMPLETELY WITH MORTAR OR NON-SHRINK GROUT.  
4. SET CAST STONE COMPONENTS IN A FULL BED OF MORTAR, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.  
5. FILL VERTICAL JOINTS WITH MORTAR.  
6. MAKE JOINTS 3/8 INCH (9 MM), UNLESS OTHERWISE INDICATED ON THE DRAWINGS.  
7. LEAVE HEAD JOINTS IN COPINGS AND SIMILAR COMPONENTS OPEN FOR SEALANT.  
8. RAKE MORTAR JOINTS 3/4 INCH (9 MM) FOR POINTING.  
9. SPONGE FACE OF EACH STONE TO REMOVE EXCESS MORTAR.  
10. TUCK POINT JOINTS TO A SLIGHT CONCAVE PROFILE.

- C. SEALANT JOINTS:  
1. COMPLY WITH SECTION 01 9000.  
2. PRIME ENDS OF CAST STONE COMPONENTS, INSERT PROPERLY SIZED FOAM BACKING ROD. AND INSTALL REQUIRED SEALANT USING SEALANT GUN.  
3. PROVIDE SEALANT JOINTS AT FOLLOWING LOCATIONS AND AS INDICATED ON THE DRAWINGS.

- D. CAST STONE COMPONENTS WITH EXPOSED TOPS.  
E. JOINTS AT RELIEVING ANGLES.  
F. CONTROL AND EXPANSION JOINTS.

3.3 SETTING TOLERANCES

- A. TOLERANCES: COMPLY WITH CAST STONE INSTITUTE STANDARD SPECIFICATION.  
1. VARIATION FROM PLUMB: DO NOT EXCEED 1/8 INCH IN 5 FEET (3 MM IN 1.5 M) OR 1/4 INCH IN 20 FEET (6 MM IN 6 M) OR MORE.  
2. VARIATION FROM LEVEL: DO NOT EXCEED 1/8 INCH IN 5 FEET (3 MM IN 1.5 M), 1/4 INCH IN 20 FEET (6 MM IN 6 M), OR 3/8 INCH (9 MM MAXIMUM).  
3. VARIATION IN JOINT WIDTH: DO NOT VARY JOINT WIDTH MORE THAN 1/8 INCH (3 MM) OR 1/4 OF NOMINAL JOINT WIDTH, WHICHEVER IS GREATER.  
4. VARIATION IN PLANE BETWEEN ADJACENT SURFACES: DO NOT EXCEED 1/8 INCH (3-MM) DIFFERENCE BETWEEN PLANES OF ADJACENT COMPONENTS OR ADJACENT SURFACES INDICATED TO BE FLUSH WITH COMPONENTS.

3.4 REPAIR

- A. SURFACE REPAIR:  
1. REPAIR CHIPPING AND OTHER SURFACE DAMAGE NOTICEABLE WHEN VIEWED IN DIRECT DAYLIGHT AT 20 FEET (6 M).  
2. REPAIR WITH MATCHING TOUCHUP MATERIAL PROVIDED BY MANUFACTURER AND IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.  
3. REPAIR METHODS AND RESULTS TO BE APPROVED BY ARCHITECT.

3.5 FIELD QUALITY CONTROL

- A. INSPECTION AND ACCEPTANCE: CAST STONE INSTITUTE STANDARD SPECIFICATION.

3.6 CLEANING

- A. IN-PROGRESS CLEANING:  
1. CLEAN CAST STONE COMPONENTS AS WORK PROGRESSES.  
2. REMOVE MORTAR FINS AND SMEARS BEFORE TOOLING JOINTS.  
B. FINAL CLEANING:  
1. CLEAN EXPOSED CAST STONE, AFTER MORTAR IS THOROUGHLY SET AND CURED.